



Botanical Report

Crescent Creek Wild and Scenic River Boundary Designation and Management Plan

Deschutes National Forest
Crescent Ranger District



Prepared by Christina Veverka, Crescent District Botanist

January 27, 2018

EXECUTIVE SUMMARY

This report documents consideration of botanical resources related to the boundary designation and management plan for the Crescent Wild and Scenic River (WSR) including:

- 1) Biological Evaluation for Threatened, Endangered, and Sensitive (TES) botanical species
- 2) Botanical Report for Survey and Manage Species
- 3) Risk Assessment for Invasive Plants

Summary of Findings

TES

There is a small stand of whitebark pine, an R6 Sensitive species, within the WSR along the canyon section of Crescent Creek. This is the only known TES botanical occurrence within the WSR. **Determination:** The proposed action will not impact individuals or habitat of TES plants and will not contribute to a trend towards Federal listing or cause a loss of viability to TES populations or species.

Survey and Manage

There are no known Survey and Manage sites within the Crescent Creek WSR. The Proposed boundary designation and management plan does not involve any habitat-disturbing activities within old-growth forest stands, so there is not a requirement for botanical surveys for listed Survey and Manage species. While there are no known Survey and Manage occurrences within the WSR, there are several sites just outside the WSR boundary on the west side of Odell Butte.

Invasive Plants

There is an extensive infestation of reed canarygrass and birds' trefoil along the lower section of Crescent Creek. All other known invasive infestations are located along Hwy 58, Cut-off road, and 60 road and are treated on annual basis as part of the District's invasive program. The Crescent WSR will have a LOW RISK for the introduction/and or spread of invasive plant species within the project area. As no ground-disturbing activities are proposed with this project, no mitigations are recommended to reduce the introduction and/or spread of noxious weeds.

Note: This report is an updated version of the botanical reports prepared for the Crescent Creek WSR project on November 11, 2009, and subsequently revised in November 2015.



Crescent Creek Wild and Scenic River – Boundary Designation and Management Plan

Biological Evaluation for Threatened, Endangered, and Sensitive Botanical Species

Deschutes National Forest
Crescent Ranger District



Prepared by: /s/Christina Veverka
Christina Veverka
Crescent District Botanist

Date: January 29, 2018

SECTION 1: BIOLOGICAL EVALUATION

The following biological evaluation analyzes the potential effects of the Crescent Creek Wild and Scenic Management Plan on Threatened, Endangered, and Sensitive (TES) botanical species on the current Region 6 Forester's Sensitive Plant List (revised July 7, 2015) which are documented or expected to occur on the Deschutes National Forest (Refer to Appendix A for the 2015 Sensitive Species List for the Deschutes National Forest).

Project Description

The Crescent Ranger District proposes to designate a boundary and develop a comprehensive management plan for the section of Crescent Creek that is designated as a Wild and Scenic River (WSR). The plan would amend the Deschutes National Forest Land and Resource Management Plan Standards and Guidelines (USFS 1990) to provide specific management direction where needed to protect or enhance river values.

The designated area includes a 10 mile segment, beginning at the outlet of Crescent Lake and ending at the Forest Service boundary just east of the Crescent cut-off Road (Fig. 1). Legal description of this project from SW 1/4 of Section 11, T24S, R6E to the west section line of Section 13, T24S, R7E. Six of the ten miles of Crescent Creek designated as Wild and Scenic River corridor is managed by the U.S. Forest Service with the balance in private ownership.

The plan shall address resource protection, development of lands and facilities, user capacities, and other management practices necessary or desirable to achieve the purposes of this Act. It is also should guide public use and enjoyment of the river while protecting and enhancing the river's Outstandingly Remarkable Values (ORVs).

The Management Plan will include a mix of existing and new Forest Plan Standards and Guidelines to address protection of the river and its ORVs for which are deemed unique. Included in this plan are recommendations for future development and identification of a corridor boundary that best protects the Outstandingly Remarkable Values and monitoring.

Methods

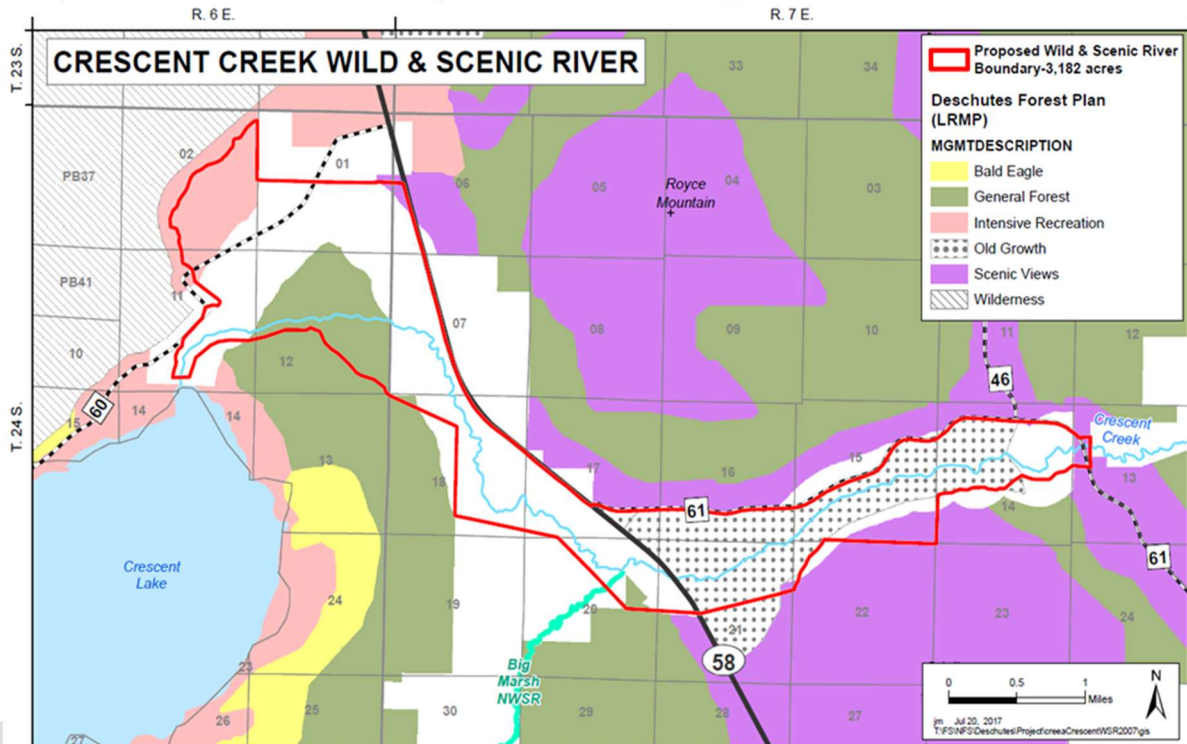
Pre-field Review and Field Surveys

A pre-field review for TES plant species was conducted in May 2009, November 2015, and July 2017. This consisted of reviewing the following data sources for known occurrences of rare botanical species within the proposed WSR boundary for Crescent Creek:

- Regional Forester's (R-6) Special Status Species List (updated July 7, 2015)
- Deschutes and Ochoco National Forests Sensitive Plant List (revised July 2015)

- Oregon Biodiversity Information Center: Rare, Threatened and Endangered Plant Species Occurrences (data requests May 2009, September 2015, November 2017)
- NRIS (Natural Resource Inventory System) database for the Deschutes National Forest: Element Occurrence records (accessed May 2009, November 2015, December 2017)

Figure 1. Location and boundary of Crescent Creek Wild and Scenic River



In addition, a Habitat Review of all the TES plant species known or suspected to occur on the Deschutes National Forest were compared with habitats that occur within the proposed WSR boundary. This was done using a variety of data sources that included the following: 1) 2015 Deschutes TES Plant Species List, 2) Deschutes GIS corporate data layers, and 3) GoogleEarth imagery. The result of this exercise was to determine potential habitat areas where TES plant species may be located.

Surveys within the Crescent Creek WSR include a focused wetland survey within the Crescent Fen (June 9th and 23rd, 2009) which is located along the 620 road in the southwestern corner of the WSR boundary. A survey for reed canarygrass along Crescent Creek was conducted in September of 2016, and botanical surveys were conducted along various sections of Crescent Creek in July and August of 2017.

Existing Conditions

TES Plants and Fungi

There is only TES occurrence within the WSR, which consists of a small stand of whitebark pine (*Pinus albicaulis*) along the canyon segment of Crescent Creek below Odell Butte. This stand was found and documented during recent botanical surveys within the Ringo planning area that encompasses Odell Butte. Whitebark is currently and R6 Sensitive species and is also a candidate species for listing under the Endangered Species Act. Below is a brief summary of the ecology and conservation concerns with whitebark pine.

Whitebark pine tends to be a cold tolerant, subalpine species where it is found on the wind-swept ridges and peaks in western North America. This species ranges from the mountains of British Columbia Washington and Oregon, south to the Sierra Range of California and east to the Rocky Mountains (Tilley et al. 2011). Whitebark pine is considered a keystone species and plays a vital ecological role in its alpine habitat (Schwandt 2006). As a pioneer species it colonizes the poorly developed, glacial soils of high elevation areas (Murray 2005). The trees catch snowdrifts and shade cover which helps reduce snowmelt in such areas, regulating runoff and reducing soil erosion (American Forests 2016). Most importantly, the seeds of whitebark pines serve as an energy-rich food source for a number of wildlife species, most notably Clark's nutcracker and grizzly bears (Mattson et al. 1992, 2001).

Whitebark pine is in severe decline throughout the species range (Keane et al. 2010). The primary causes of this decline are white pine blister rust (*Cronartium ribicola*), an introduced fungal pathogen, and the native mountain pine beetle (*Dendroctonus ponderosae*). Climate change is also considered a threat to whitebark pine. Species not normally adapted to alpine areas at or near timberline are likely to spread to higher elevations with increases in temperatures (Tilley et al. 2011). Fire suppression has also been attributed to declines in whitebark, with shade-tolerant trees encroaching into areas dominated by whitebark (Kendall and Keane 2001). Due to dramatic decline of whitebark pine throughout its range, in 2011 it was listed by the U.S. Fish and Wildlife Service as a candidate species under the Endangered Species Act (USFS 2014)

Fens

Fens, also known as ground-water dependent ecosystems (GDE), are located within the southwestern section of the WSR boundary along the 620 road and railroad tracks. These fens have been created by a series of springs, the largest of which forms the headwaters for Cold Creek.

In the Pacific Northwest, fens have been identified as unique wetland features that are formed by surface and/or groundwater, and are generally characterized by an extensive peat layer and a neutral to alkaline water chemistry. Fens contain a unique assemblage of plant species that are only found in such areas.

Beautiful and unique plant species common to Pacific Northwest fens were documented within the Crescent Fen, including sundew (*Drosera anglica*), bladderwort (*Utricularia*

intermedia), elephant heads (*Pedicularis groenlandica*), sticky toefieldia (*Tofieldia glutinosa*) and mosses such as *Calliergonella cuspidata* and *Aulacomnium palustre*.

The fens within the proposed WSR are intact and appear to have little recent disturbance to them. However, there has been some historical impact to these areas, at least at the western edge of WSR boundary. This includes the construction of the railroad, with mounds of fill placed across sections of wetland. There is also the 620 road, which parallels the railroad tracks. This gravel road also crosses a section of wetland, as well as several springs. (Culverts have been installed where the road passes over the springs.) It appears that water movement has not been completely impaired by the road and its fill, as subsurface seepage is occurring from the springs on the west side of the road, to the main body of the fen on the east side. However, it can be assumed that the road and the railroad tracks have impaired the natural hydrology of the site to a certain degree. Although the road does experience light use from a variety of sources (OHV's, mountain bikes, snowmobiles, and horses), there was no evidence of human disturbance within the fens during the 2009 field surveys. There was also very little indications of wildlife impact to fens, as from big game foraging in these areas. Noxious weeds were also not observed within or around these fen complexes.

Fig. 2. View of Crescent Fen, one of the unique wetland features found within the proposed Crescent Wild and Scenic River.



Photo by Christina Veverka, 2009

Wetlands – In addition to fens, other wetland types are also present within the proposed WSR corridor. This includes an extensive forest/shrub wetland just east of the Crescent Lake Road (60 Road). While the fens are dominated by mosses and sedges, this wetland is dominated by dense stands of bog blueberry (*Vaccinium uliginosum*) and bog birch (*Betula glandulosa*), with a scattered overstory of lodgepole pine (*Pinus contorta*). This wetland

also contains extensive mounds of *Sphagnum* mosses, with swathes of sedges such as wide-fruit (*Carex utriculata*) and water sedge (*C. aquatilis*).

The other large wetland within the proposed Crescent WSR is located where Crescent Creek passes under Highway 58. This wetland is dominated by robust stands of Geyer's and Lemmon's willows (*Salix geyeriana* and *S. lemmonii*, respectively), with scattered patches of bog birch. This wetland complex also contains extensive meadows of sedges (water and wide-fruit) and in drier areas, stands of tufted hairgrass (*Deschampsia caespitosa*).

A similar wetland type is found at the northeastern corner of the Crescent WSR, at the site of the Crescent Creek Campground. Here the vegetation is also dominated by Geyer's and Lemmon's willows, with an understory of spiraea (*Spiraea douglasii*) and wild rose (*Rosa woodsii*). This site also has a vigorous aspen stand (*Populus tremuloides*), which has been protected by an elk exclosure fence.

These wetlands, with their dense cover and lush sedge meadows, provide key habitat for numerous wildlife species. During 2009 field surveys, ample evidence was seen of bedding and browsing areas from big game (elk and deer). These wetlands have had minimal impact from humans, at least on Forest Service lands. There has not been livestock grazing on the Crescent District for several decades, and currently there is known grazing of these wetlands on private lands within the WSR boundary. The Forest Service has not logged in the wet forest stands, although some hand thinning of encroaching lodgepole has been done along the edges of the sedge/grass meadows.

Fig. 3. View of wetland (adjacent Hwy 58) along the Crescent Wild and Scenic River.

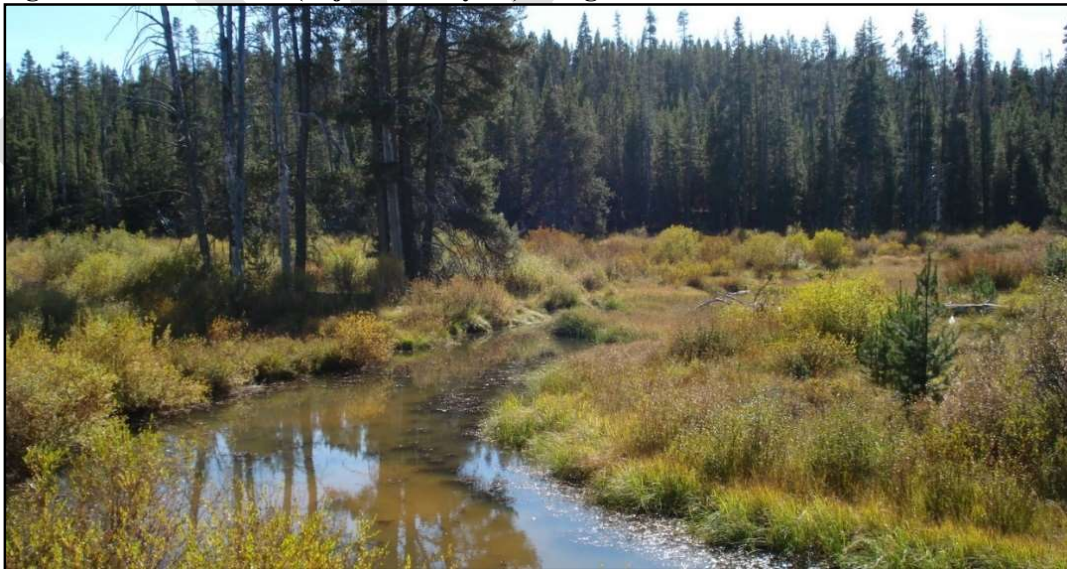


Photo by Christina Veverka, 2009

Riparian Corridor – The riparian zone along the Crescent is a diverse collection of mixed conifer, montane shrubs, and numerous grass, sedge, and forb species. Although the plant species diversity does vary along the length of the creek, the riparian zone tends to be

dominated by lodgepole pine, with inclusions of Englemann spruce (*Picea englemannii*) and white fir (*Abies concolor*). Montane shrubs such as alder (*Alnus incana*), spiraea, and wild rose form a dense undergrowth along the river edges. Woody debris within the creek creates islands of plant diversity, where moisture-loving species can thrive. Such islands can be carpeted with lush moss mats (*Brachythecium frigidum*), or with robust stands of sedges.

Riparian plant communities are generally rejuvenated by natural disturbances, such as flooding and fire. But both of these prime disturbance factors have been historically excluded from Crescent Creek and adjacent forest communities. The construction of the Crescent Dam in 1922 has resulted in regulated stream flows that have replaced the normal cycle of low and high stream velocities. Without such natural disturbances, the vigor of the riparian vegetation has been impacted.

Fig. 4. View of a typical riparian corridor along the Crescent Wild and Scenic River, with Odell Butte in the background.

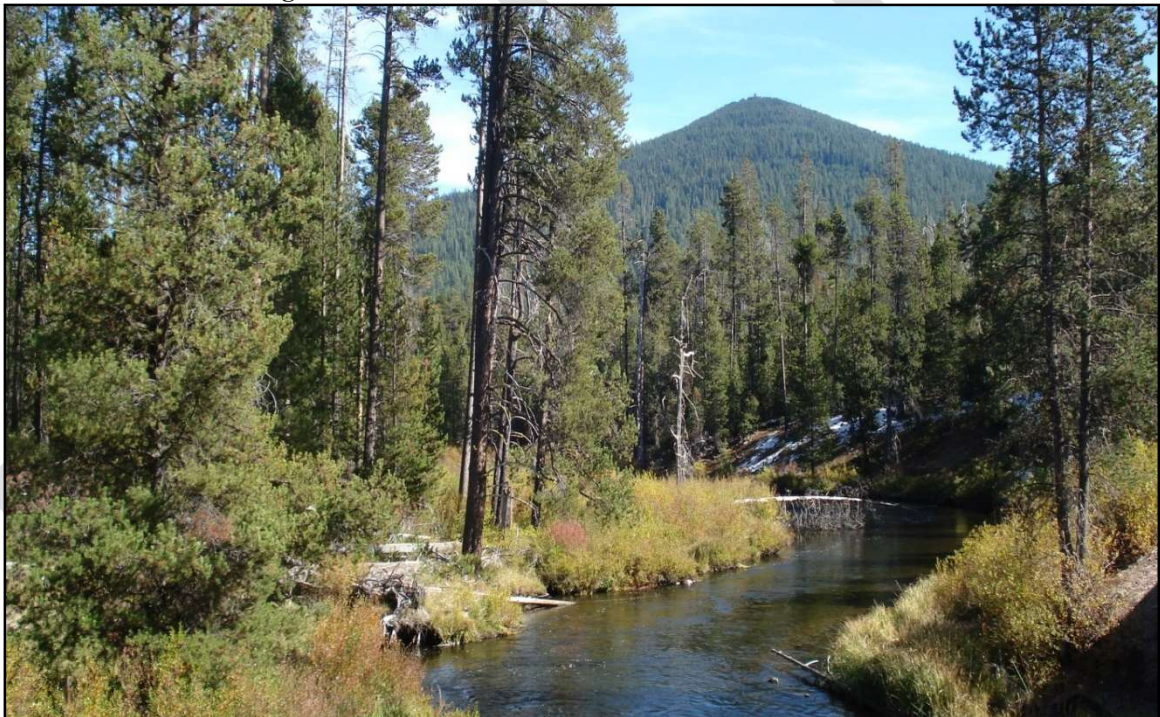


Photo by Christina Veverka, 2009

Some loss of riparian vegetation has occurred on private lands along the Crescent, where landowners have removed native vegetation to create ‘view corridors’ to the river.

Forest Plant Communities – Within the upper reaches of the river corridor, the forest is primarily composed of extensive stands of small diameter lodgepole pine with a sparse understory of manzanita (*Arctostaphylos patula*), upland sedge (*Carex inops*), and wild strawberry (*Fragaria virginiana*).

The central portion of the river corridor is dominated by private lands, so forest stands have been altered through logging, fuels reduction activities, and housing and resort development.

The lower portion of the river flows through Forest Service lands, and was identified for its outstanding and remarkable scenic values. Here the Crescent flows through a narrow and twisting canyon, with jagged rock formations jutting out from the steep terrain. Here the forest is composed of a mixed overstory of lodgepole and ponderosa (*Pinus ponderosa*) pine, with an understory that is typical for this forest type: manzanita (*Arctostaphylos patula*), bitterbrush (*Purshia tridentata*), wax current (*Ribes cereum*), bottlebrush squirreltail (*Elymus elymoides*), and Ross's sedge (*Carex rossii*).

Indirect and Direct Effects

Because the boundary designation and management plan for Crescent Creek WSR does not authorize any ground-disturbing activities, there are no direct impacts to TES plant species from this project. Under the No Action Alternative, the default boundary would be utilized for the Crescent WSR, and the interim management guidelines used for decision making purposes.

However, the designation and the management plan will have long-term implications for the preservation and conservation of the unique botanical habitats within the Crescent WSR. By establishing the WSR, these habitats will be better protected from future land management activities, such as structure building, road construction, and timber harvesting. With greater protection of this area, comes an increased protection of the native plant communities within the wetland and riparian areas.

Cumulative Effects

The most significant impact to the Crescent WSR area has been the construction of the Crescent Dam, and the subsequent modification to river flows. As discussed earlier, this has had the greatest impact on both the fisheries within the Crescent and the vegetation within the riparian corridor. The construction of the railroad and the 620 road along the western edge of the WSR boundary is another historic impact, mostly affecting the springs and the associated fens within that area. The Crescent Lake Road (61 Road) has also had an impact in the area, as it has become the main vector for weeds into the area.

Timber management on Forest Service lands has also impacted the area. The most recent timber sale within the WSR include the Trig Stewardship project (along the Crescent Lake Road), which focuses on thinning small-diameter lodgepole pines. Other recent (within the last 5 years) timber sales around the Crescent Lake area include SLT, Camp Fiber, and LSR Demo. There has also been a fuels reduction project within the Crescent Lake Wildland-Urban Interface (WUI), which reduced fuel loading on Forest Service lands that buffer the community of Crescent Lake Junction. These projects have had little impact on wetland areas within the WSR, as these projects avoided any tree removal in wetlands or riparian corridors.

On private lands, forest stands have been cleared for roads and houses, with trees thinned around homes for fire protection. The riparian corridor has been impacted by some of this development, as land owners have cleared vegetation to obtain better views of the river. With rural subdivisions placed along the river, there is the potential for landowners to introduce non-native invasive plants into the area.

On private lands in the southern portion of the WSR (sections 17 and 20), the forest has been heavily logged, as is clearly seen from aerial photographs and GoogleEarth images. Although it appears that logging has not occurred within the riparian corridor, the forest has been heavily thinned up to the riparian edge. This may increase the potential for soil erosion into the Crescent, especially during heavy storm events.

DETERMINATION

The Proposed Action and Alternative will have no impact to individuals of whitebark pine and will not contribute to a trend towards federal listing or a loss of viability to the population or species. It is expected that the Proposed Action and Alternative 3 will have a beneficial impact to whitebark pine.

Table 4: Summary of effects to Sensitive botanical species by alternative

Species	Alternative A (No Action)	Alternative B
Vascular plants		
<i>Agoseris elata</i>	N/A	N/A
<i>Arnica viscosa</i>	N/A	N/A
<i>Astragalus peckii</i>	N/A	N/A
<i>Botrychium ascendens</i>	N/A	N/A
<i>Botrychium crenulatum</i>	N/A	N/A
<i>Botrychium minganense</i>	N/A	N/A
<i>Botrychium montanum</i>	N/A	N/A
<i>Botrychium paradoxum</i>	N/A	N/A
<i>Botrychium pumicola</i>	N/A	N/A
<i>Calamagrostis breweri</i>	N/A	N/A
<i>Carex capitata</i>	N/A	N/A
<i>Carex diandra</i>	N/A	N/A
<i>Carex lasiocarpa</i> var. <i>americana</i>	N/A	N/A
<i>Carex livida</i>	N/A	N/A
<i>Carex retrorsa</i>	N/A	N/A
<i>Carex vernacula</i>	N/A	N/A
<i>Castilleja chlorotica</i>	N/A	N/A
<i>Cheilanthes feei</i>	N/A	N/A
<i>Collomia mazama</i>	N/A	N/A
<i>Cyperus acuminatus</i>	N/A	N/A
<i>Cyperus lupulinus</i> ssp. <i>lupulinus</i>	N/A	N/A

Species	Alternative A (No Action)	Alternative B
<i>Eucephalis gormanii</i>	N/A	N/A
<i>Gentiana newberryi</i> var. <i>newberryi</i>	N/A	N/A
<i>Lipocarpa aristulata</i>	N/A	N/A
<i>Lobelia dortmanna</i>	N/A	N/A
<i>Lycopodiella inundata</i>	N/A	N/A
<i>Lycopodium complanatum</i>	N/A	N/A
<i>Muhlenbergi minutissima</i>	N/A	N/A
<i>Ophioglossum pusillum</i>	N/A	N/A
<i>Penstemon peckii</i>	N/A	N/A
<i>Pilularia americana</i>	N/A	N/A
<i>Pinus albicaulis</i>	MIHH	BI
<i>Potamogeton diversifolius</i>	N/A	N/A
<i>Pyrola dentata</i>	N/A	N/A
<i>Rorippa columbiae</i>	N/A	N/A
<i>Scheuchzeria palustris</i> ssp. <i>americana</i>	N/A	N/A
<i>Schoenoplectus subterminalis</i>	N/A	N/A
<i>Utricularia minor</i>	N/A	N/A
Bryophytes		
<i>Anastrophyllum minutum</i>	N/A	N/A
<i>Anthelia julacea</i>	N/A	N/A
<i>Blepharostoma arachnoideum</i>	N/A	N/A
<i>Brachydontium olympicum</i>	N/A	N/A
<i>Cephaloziella spinigera</i>	N/A	N/A
<i>Conostomum tetragonum</i>	N/A	N/A
<i>Encalypta brevipes</i>	N/A	N/A
<i>Entosthodon fascicularis</i>	N/A	N/A
<i>Haplomitrium hookeri</i>	N/A	N/A
<i>Harpanthus flotovianus</i>	N/A	N/A
<i>Jungermannii polaris</i>	N/A	N/A
<i>Lophozia gillmani</i>	N/A	N/A
<i>Marsupella sparsifolia</i>	N/A	N/A
<i>Nardia japonica</i>	N/A	N/A
<i>Polytrichastrum sexangulare</i>	N/A	N/A
<i>Preissia quadrata</i>	N/A	N/A
<i>Pseudocalliergon trifarium</i>	N/A	N/A
<i>Rivulariella gemmipara</i>	N/A	N/A
<i>Schistidium cinclidodonteum</i>	N/A	N/A
<i>Schofieldia monitcola</i>	N/A	N/A
<i>Tortula mucronifolia</i>	N/A	N/A

Species	Alternative A (No Action)	Alternative B
<i>Trematodon asanoi</i>	N/A	N/A
Lichens		
<i>Texosporium sancti-jacobi</i>	N/A	N/A
<i>Tholurna dissimilis</i>	N/A	N/A
Fungi		
<i>Gastroboletus vividus</i>	N/A	N/A
<i>Helvella crassitunicata</i>	N/A	N/A
<i>Pseudorhizina californica</i>	N/A	N/A
<i>Ramaria amyloidea</i>	N/A	N/A
<i>Rhizopogon alexsmithii</i>	N/A	N/A

NI No impact

MIIH May impact individuals or habitat, but will not likely contribute to a trend towards federal listing or a loss of viability to the population or species.

WIFV* Will impact individuals or habitat with a consequence that the action may contribute to a trend toward federal listing or cause a loss of viability to the population or species

BI Beneficial impact

N/A No Habitat or species present

*Trigger for a significant action as defined in NEPA

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SECTION 2: BOTANICAL REPORT FOR SURVEY AND MANAGE SPECIES

Introduction

In 1994 the Bureau of Land Management and the Forest Service adopted standards and guidelines for the management of late-successional and old-growth forest related species within the range of the northern spotted owl, commonly known as the Northwest Forest Plan (USFS/BLM 1994). This plan includes mitigation measures for the protection and conservation of about 400 rare and/or isolated species. These measures, known as the Survey and Manage Guidelines, include a requirement for management of known rare plant/wildlife sites and pre-habitat disturbing surveys (within old-growth stands) for categories of species (USFS/BLM 2001).

Existing Conditions

Although the Crescent Creek WSR lies within the boundary of the Northwest Forest Plan, the boundary designation and management plan do not authorize any habitat-disturbing activities. Because of this, no pre-disturbance surveys for listed botanical species are required.

There are no documented sites of Survey and Manage botanical species within the WSR boundary. However, there are several sites within .5 miles of the boundary on Odell Butte. These sites were found during recent botanical surveys within the Ringo planning area.

Indirect, Direct, and Cumulative Effects

There will be no indirect, direct, or cumulative effects to Survey and Manage botanical species because 1) there are no known Survey and Manage sites within the WSR and 2) the boundary designation and management plan do not authorize any habitat-disturbing activities within the WSR

Reference

USDA FS/USDI BLM. 1994. Record of Decision for Amendments to Forest Service and Bureau of Land Management Planning Documents Within the Range of the Northern Spotted Owl. PDF, 635K.

USDA FS/USDI BLM. 2001. Record of Decision and Standards and Guidelines for Amendments to the Survey and Manage, Protection Buffer, and other Mitigation Measures Standards and Guidelines.

SECTION 3: INVASIVE PLANT RISK ASSESSMENT

Introduction

The following report analyzes the risk for the introduction and spread of invasive plants into the Crescent Creek WSR area as a result of the proposed boundary designation and management plan. Site specific weed concerns are discussed in the effects analysis.

Invasive species can have significant deleterious impacts to native systems, including the loss of native species, loss of wildlife habitat (Trammel and Butler 1995), disruption of natural fire cycles (D' Antonio and Vitousek 1992), degradation of recreation lands, and economic costs (Westbrooks 1998, PNWER 2012).

Due to their harmful ecological effects on the environment, Forest Service policy requires the prevention and management of invasive species, including invasive plants (FSM 2900). Although this direction includes avoiding activities that increase the potential for spreading invasive plants, the Forest Service is also directed to provide recreation opportunities, provide timber products, and maintain a road system. Since these activities can increase the risk of spreading invasive weeds, the Forest Service is directed to implement prevention measures to reduce the risk of introduction and spread of invasive plants (USDA Forest Service 2005).

An invasive plant assessment has been prepared to determine the risk of invasive species introduction or spread with the proposed project (FSM 2900). Project design features include prevention measures and recommendations that reduce the risk of introduction and spread of invasive plants.

Management Direction

National Direction

Forest Service Manual (FSM) 2900, Invasive Species Management sets forth the policy, responsibilities, and direction for the prevention, detection, control, and restoration of effects from aquatic and terrestrial invasive species (USFS 2011).

Regional Direction

Region 6 of the Forest Service has an Invasive Plant Environmental Impact Statement that provides Standards and Guidelines for the treatment and control of invasive plant species throughout all Pacific Northwest Forests (USFS 2006). Additional direction for invasive plant prevention and control for Special Use Authorizations was recently added to the Forest Service Handbook (FSH 2709.1, 52.5 Special Uses Handbook) for Region 6 that states that permit holders will be responsible for the prevention and control of invasive plants in authorizations for rights-of ways, communication sites, and recreation residences (USFS 2013).

Forest Direction

The Deschutes and Ochoco National Forests completed the Final Environmental Impact Statement (FEIS) for Invasive Plant Treatments (USFS 2012). The FEIS document provides for both manual

and chemical treatment of invasive weed infestations on the Deschutes and Ochoco National Forest, as well as on the Crooked River National Grassland.

Existing Conditions

Pre-field reviews of the Forest Service Natural Resource Manager (NRM) database indicated that most of the Crescent Creek area is free of invasive plants. Within the WSR boundary infestations are located along the major roadways including the Crescent Lake road, Hwy 58, and the Crescent Cut-off road (Figure 1). These infestations consist of common noxious weeds such as spotted knapweed (*Centaurea stoebe*), butter-n-eggs (*Linaria vulgaris*), oxeye daisy (*Leucanthemum vulgare*), and St. John's wort (*Hypericum perforatum*).

These infestations are treated on an annual basis as part of the District's herbicide treatment program. These include the following sites:

- Oxeye daisy and St. John's wort along the 60 road
- Spotted knapweed, oxeye daisy, and St. John's wort along Hwy 58
- Butter-n-eggs along Hwy 58
- Spotted knapweed on the Crescent dam

In 2016 a survey was conducted to map reed canarygrass (*Phalaris arundinacea*) infestations on Crescent Creek from its confluence with Big Marsh Creek to the Crescent Creek campground. From the results of this survey it was found that 1.6 acres of reed canarygrass is present along this section of the creek. In a subsequent survey in 2017 there were also infestations of bird's-foot trefoil (*Lotus corniculatus*) discovered within and around the reed canarygrass patches. Although not mapped, these infestation patches were observed to be as abundant as those of the reed

canarygrass. Immediate treatment of these infestations would be desired under existing NEPA (National Environmental Policy Act) documentation (USFS 2012).

Fig. 1. Reed canarygrass and bird's foot trefoil infestation within Crescent Creek.



1. However, Crescent Creek is listed as Critical Habitat for the Oregon spotted frog, which was listed in 2014 as a Threatened species under the Endangered Species Act (USFWS 2014). Due to this listing, additional environmental analysis is needed to prior to the use of herbicides within the Crescent Creek area (per. comm. Lauri Turner).

Other new infestations include small (less than 100ft²) patches of oxeye daisy within the riparian area along the upper reaches of Crescent Creek near the 60 road. These new sites will be treated in 2018 as part of the District's program to contain and/or eradicate noxious weeds.

Indirect, Direct, and Cumulative Effects

Because the proposed boundary designation and management plan do not authorize any ground-disturbing activities, these actions in and of themselves would not lead to the introduction or spread of invasive plants.

Risk Assessment Factors

The following factors are used to determine the level of invasive plant risk (low, moderate, and high) associated with the Crescent Creek WSR project.

1. Presence of known weed populations and whether or not those populations can be avoided –Moderate

While most of Crescent Creek is free of invasive plants, the presence of reed canarygrass and bird's foot trefoil along the lower reach is of concern. If left untreated, these infestations will continue to be a source of seed and propagules (rhizomes and roots) to further these infestations downstream.

Because the proposed project does not involve any ground-disturbing activities, there would be no activities around these sites that would lead to the spread of these infestations. However, there is public access to areas, specifically around Crescent Creek campground. There is also a fisherman's trail from a pull out at the Hwy 58 bridge to fishing holes along the eastern bank of the creek. Such activity could lead to the spread of these infestations from people's footwear, equipment, and pets.

2. Level of Disturbance – Low

Within those areas managed by the Forest Service, Crescent Creek receives very minimal human disturbance. Both the upper (around the 60 road) and the lower (Odell Butte area) reaches have some public recreation from occasional use from fishermen. The most public activity occurs around the Crescent Creek campground, where several access points to the creek have been created from recreational use. There are a few dispersed camping sites off of Forest Service roads that are near the creek; these always receive only occasional use.

3. Resource Value – High

Crescent Creek has been designated as a Wild and Scenic River due to Outstanding Resource Values (ORVs) such as geologic features, scenic views, and water quality.

4. Introduction Vectors – Low

As the proposed WSR boundary and management plan does not authorize any ground-disturbing activities, there is a low probability for the introduction of new invasive infestations. The most likely potential for a new infestation would come from activities on the private lands that are in the center of the WSR area. Big Marsh Creek also acts as a continual noxious weed source with reed canarygrass seed and plant material traveling down this creek and feeding into Crescent Creek.

Risk Assessment

By combining risk factors 1-4, it is determined that the boundary designation and the management plan for the Crescent Creek WSR has **LOW RISK** for the introduction of invasive plants.

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Fig. 2. View of reed canarygrass and bird's foot trefoil infestation along the east bank of Crescent Creek.



Photo by Christina Veverka 2017